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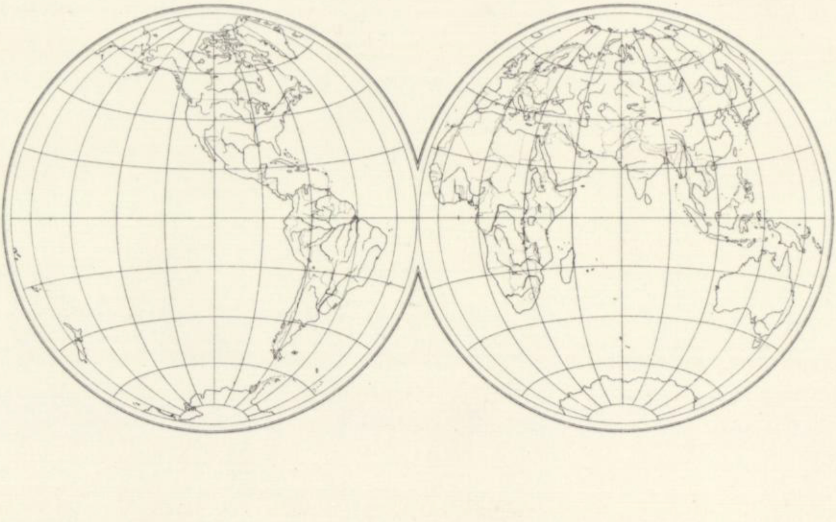
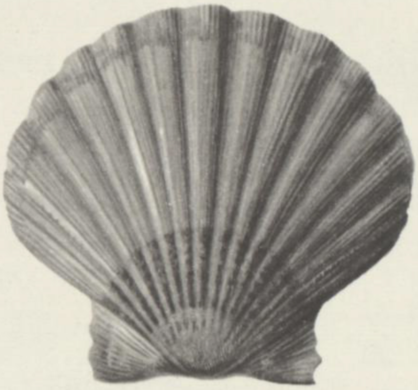
Shell Review 1959



Shell Review

1959



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Introduction

Commerce in oil is essentially international and for this commodity the world comprises virtually a single market. Sources of production are often distant from centres of consumption and the greatest benefits to all concerned—this applies equally to producing countries and to consumers who buy the end products—result from achieving the maximum flexibility in getting the right products to the right place at the right time.

Crude oil derives its value only from the ultimate sale of the finished oil and chemical products manufactured from it. It is the sale of these products to the consumer that generates the money to pay royalties and taxes to the oil-producing countries; to pay for the complex series of operations—exploration, production, transportation, manufacturing, distribution and research—that must precede the sale, and finally to give shareholders in the many companies a return on the investment of risk capital that makes the whole process possible.

Throughout its transition from crude oil underground to refined products delivered to consumers, oil is subject to the impact of world events and their economic consequences. If these bring changes in levels of prosperity, both the rate of consumption and the prices at which the finished products will sell may rise or fall. The world economic climate thus determines the demand for oil, and this demand, in relation to available supplies and the cost-efficiency of competing suppliers, governs the price at which it can be sold.

It is against this constantly changing background that the companies of the Royal Dutch/Shell Group* conduct their business and in relation to which a review of their activities in any one year should be considered.

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* *In this review the expression ' Group ' is used to refer to the Royal Dutch/Shell Group of companies or to one or more of such companies, as the context may require.*

The World Economic Climate

In 1959 the world economy recovered, if somewhat unevenly, from the setbacks of the previous two years.

In the United States, where the recession had been most severe, recovery continued and new high levels of industrial production, consumer spending, and employment had been reached by mid-year. Further expansion was interrupted by the prolonged steel strike, and industrial activity in the second half of 1959, though still higher on average than in the previous two years, did not fulfil the promise of the first six months. Business confidence remained strong, however, and was a factor contributing to the strong expansionary forces in the economy which were evident at the end of the year.

Outside the United States, economic growth was resumed after a pause which had been as long as two years in some areas. The pace of recovery was slowed by the fact that some of the basic industries did not share in the general movement, but the overall picture was encouraging after the uncertainty of 1958. In the main industrial areas of the world economic expansion was faster than elsewhere. Production increased in West European countries and in general trade expanded, the cost of living remained stable and the balance of payments strong.

The significance for the rest of the world of this greater industrial activity was shown in the substantial increase in the volume of exports from the commodity-producing areas in the second half of the year, even though this was accompanied by no more than a partial recovery in prices. Economic development in these areas was not uniform, but was conditioned primarily by the behaviour of commodity markets. In Asia and Australasia recovery was most pronounced; in Africa and the Middle East growth was more moderate. In Latin America, however, where low commodity prices accentuated balance of payments problems, the economic situation showed little significant improvement over 1958, although measures of stabilization in many of these countries provided the prerequisite for further expansion.

The flow of capital to the less developed countries—one of the basic factors essential to their growth—continued in 1959. Since the domestic supply of capital and foreign exchange available in these areas is limited, foreign private capital and its accompanying skills are vital to economic advance and play a complementary role to capital from foreign official sources. Recognition of this fact has led to a growing awareness of the need to attract foreign investment and to ensure its continuance by fair treatment and the creation of a favourable environment. In the last four or five years the amount of foreign private capital investment in these areas has increased rapidly to reach a figure amounting to about two-thirds of the volume of foreign investment by government and international agencies, and it must be expected to continue to grow if economic development is not to be retarded.

The Impact on Oil

THE DEMAND for energy in 1959 increased only slightly despite the improved economic climate. The chief reasons for this were the delayed recovery in some of the basic industries (since these are the largest consumers of energy and in particular of coal) and the continued improvement in the efficiency with which the various fuels are used. Demand for coal continued to be relatively weak; demand for oil on the other hand was strong, a reflection partly of the growth of consumption in transport, where oil has virtually no substitute, and partly of the convenience and efficiency of oil products in a growing number of uses in all sectors of the economy. Although the contrasting experience of coal and oil in 1959 provoked considerable pressure to protect coal, there was general reluctance to discriminate against oil, in recognition of the fact that the coal industry's chief difficulties lie elsewhere and that there is a danger to the economy in bringing about an artificial increase in the cost of energy supplies.

World oil consumption rose by some 6 per cent compared with 1958. In both the United States and Canada demand recovered rapidly from the previous year when the main influence of recession had been felt, and in Western Europe consumption increased by over 10 per cent.

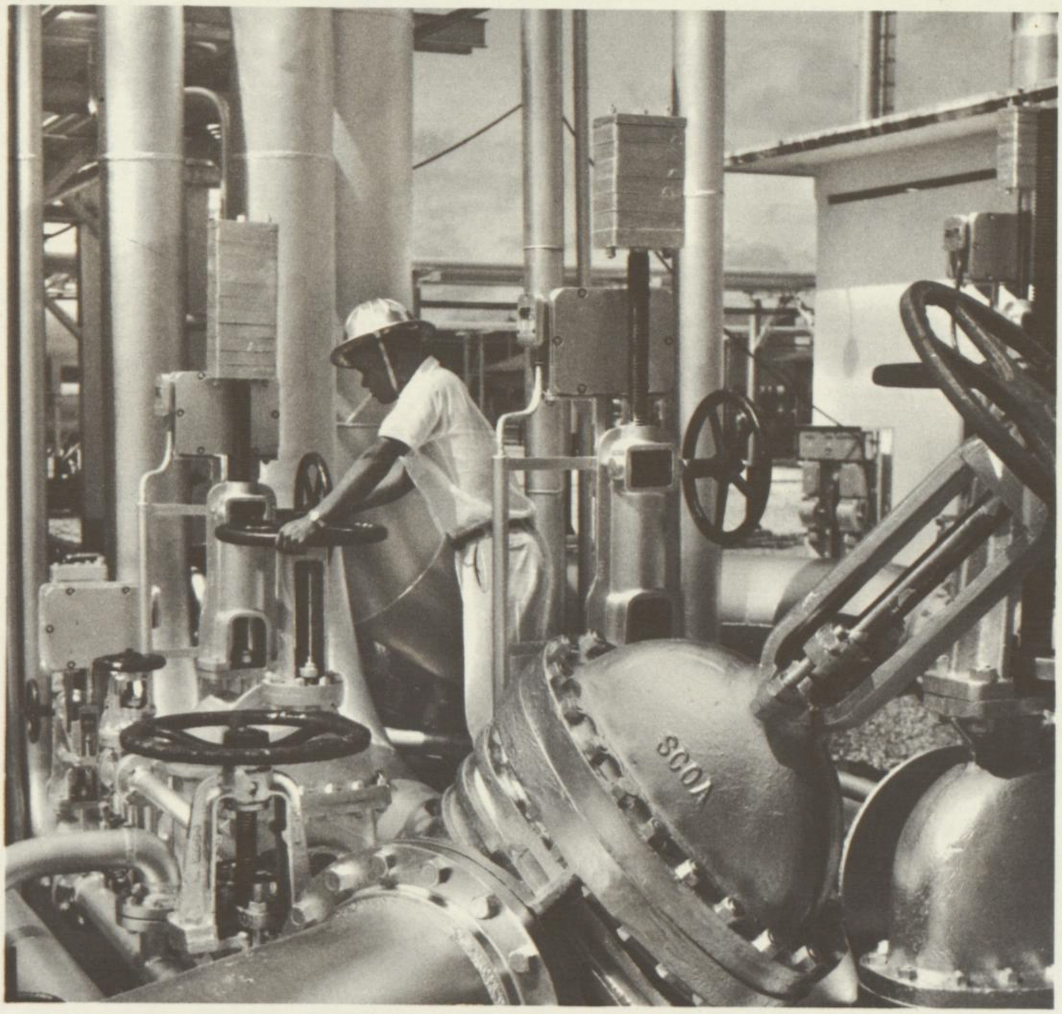
Industrial areas remained the largest users of oil; the United States and Western Europe together consumed nearly three-quarters of the oil used in 1959. At the same time demand in commodity-producing areas rose substantially, except in Latin America where continuing economic difficulties kept down the rate of increase.

Consumption of fuel oil, widely used for industrial purposes, and of middle distillates for inland transport, grew faster than the demand for other oil products. Motor gasoline consumption, although rising substantially in volume, now tends to increase at a slower rate than the average for all oil products.

During 1959 the world availability of crude oil continued to mount as the search for oil bore further fruit. Competition for outlets, already severe, was intensified by the resulting situation of easy supply. In addition, the United States found it necessary to extend the control of oil imports and to make it mandatory. Since these imports represent a significant percentage of the demand on the resources of the rest of the world, the controls added further to competitive pressures elsewhere.

Although the present easy supply position may continue for some time, it is considered to be temporary when viewed in relation to the longer-term outlook. The world consumption of oil has roughly doubled in each decade of this century. The rapid growth of world population, expanding economies and rising living standards, increasing industrialization, the mechanization of agriculture, and many other factors all combine to indicate that the volume of world demand for oil must continue to grow substantially.

Canada: Planting a seismometer in the snow



Brunei: Control valves in the gas processing plant, Seria

production rights were acquired in 1956 is now making an important contribution to the total output, and additional discoveries have been made in another area. Field tests investigating a new method of thermal secondary recovery, to extract additional quantities of oil from sands already partially depleted by primary recovery methods, were continued in Mene Grande and Tia Juana. Work was also started on a new plant to re-inject high-pressure gas into certain oil reservoirs beneath Lake Maracaibo with a view to increasing the ultimate recovery of oil.

✦ Production rates in **Trinidad** were considerably increased in the marine areas of Trinidad Northern Areas, Limited, in which Shell Trinidad Limited has a one-third interest; appraisal of prospects in the land holdings of Shell Trinidad was continued.

✦ Exploration work began near the mouth of the Rio Negro under a contract which was signed in 1958 between the Government of **Argentina** and the newly-formed Shell Production Company of Argentina Limited.

✦ In **France,** an oilfield was discovered in the Paris basin at Saint-Martin-de-Bossenay by Compagnie des Pétroles du Sud-Est Parisien, in which Shell Francaise has a 50 per

Exploration and Production

THERE ARE SEVERAL reasons why the total amount of oil that can be supplied from all developed production sources is at the moment greater than the total demand. Broadly speaking they add up to the fact that the success of the long-range efforts by companies searching for oil has resulted in the temporary creation of a supply potential somewhat in advance of the demand that eventually will absorb it.

Although this situation may well persist for a time the long-term position is unchanged; if they are to match the rising demand the oil companies must continue to invest large sums in the search for and development of new oilfields.

An oilfield, even when it has been discovered, may take ten years or more to develop; the exploration currently being undertaken by Group companies is therefore aimed at providing for the expanded demand they will have to meet in the late 1960's and the 1970's.

In recent years additional countries have become oil producers and it is reasonable to expect that still more will be added to the list in future. Some of these will have an exportable surplus of oil and this inevitably will change the future pattern of supply and will further intensify the competition for outlets; competition, that is, between oil from different producing countries as well as between the individual oil companies. The current surplus of production has sharply emphasized the fact that the oil which is cheapest to produce is most likely to find a market.

Total production of crude oil and natural gasoline by Group companies in 1959, including quantities received under special supply contracts, was running at an average of 2,465,000 barrels a day. This represented an increase of 11 per cent over the total for 1958, but despite this considerable rate of withdrawal the estimated level of crude oil reserves was more than maintained. The growth in production over the past ten years is illustrated on page 10.

In 1959 Group companies were exploring for oil, or actually producing it, in every continent; the following are examples of these operations:

✦ Sizeable new oil discoveries were confirmed by Shell Oil Company of Canada, Limited at Simonette River and Virginia Hills in northern Alberta, **Canada.** Further gas accumulations were found in south-western Alberta and in the Peace River area in the north-west.

✦ In the **United States,** results of test wells have amply justified Shell Oil Company's purchase in 1959 of exploration and production rights in extensive areas, mostly off the coast of Louisiana. Promising discoveries were also made in Texas.

✦ In the plains south of the Andes in **Colombia,** the first exploration well in the eastern sector of the Llanos area found unfavourable conditions and the American company associated with Shell Cóndor S.A. withdrew from the venture. Shell Cóndor, however, has decided to continue the search in the western part of the region.

✦ Group production in **Venezuela** in 1959 averaged 824,000 barrels daily, to which may be added 89,000 barrels daily from contractual arrangements with another oil company. Development in one of the Lake Maracaibo areas over which exploration and cent interest. By the end of the year 140,000 barrels of oil had been produced from this oilfield.

✦ In the **Netherlands,** gas in quantities sufficient to make it economically recoverable was found near the town of Groningen. Exploration work included a seismic survey off the west coast. The production of N.V. Nederlandse Aardolie Maatschappij, in which the Group has a 50 per cent interest, showed an increase over 1958 despite the decline in production from the Schoonebeek oilfield in the eastern part of the country.

✦ Exploration in **Iran** by the company in which the Group has a 14 per cent interest resulted in a number of new discoveries, of which the most important were at Binak close to the coast, and at Ahwaz between Abadan and the old oilfields.

✦ With the arrival of the new drilling barge The Shell Company of Qatar Limited was able to recommence exploration drilling in the offshore areas of **Qatar,** at a site some 55 miles from the coast.

✦ In the **French Sahara,** Compagnie des Pétroles d'Algérie, in which the Group has a 65 per cent interest, found some oil shows which so far have not proved to be in commercial quantities. Compagnie de Recherches et d'Exploitation de Pétrole au Sahara, in which the Group's interest is 35 per cent, continued the development of the Edjeleh and Zarzaitine fields, and the construction of the pipeline linking them with the Mediterranean. Oil and gas discoveries were made in different areas which have still to be appraised.

✦ The exploration well drilled at Bir Tlacsin, in **Libya,** discovered oil in quantities which have not yet been determined, and further wells are being drilled. Exploration activities in the concessions in the Sirte area were increased considerably during 1959.

✦ Continuing development work in **Nigeria,** particularly in the Bomu field, brought the production of the Shell-BP Petroleum Development Company of Nigeria Limited, in which the Group has a 50 per cent interest, up to 16,500 barrels daily by the end of the year. Further exploration resulted in several new discoveries including one at Ughelli, the first in the Western Region of Nigeria. Appraisal of these discoveries by further drilling to determine their economic value has still to be carried out.

✦ A deep exploration well at Karampur in West **Pakistan** was completed by Pakistan Shell Oil Company Limited, in which the Group has a 75 per cent interest, without encountering significant oil shows. New exploration acreage has been taken up, however, in both East and West Pakistan.

✦ In **New Guinea,** where a Group company operates in partnership with two American companies, limited exploration is being continued near the producing fields at Klamono, but in view of discouraging results it has been decided to discontinue exploration in the eastern part of the country.

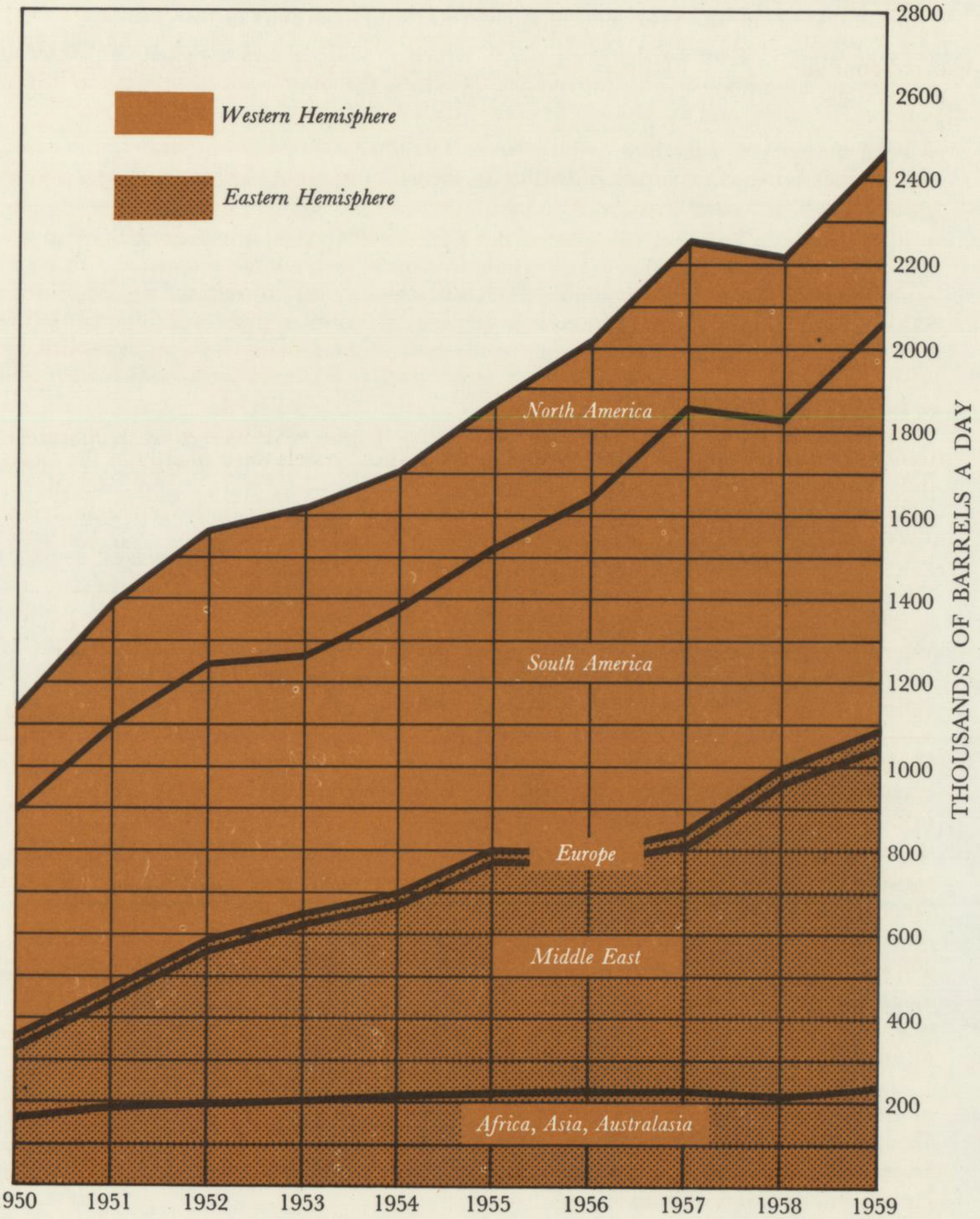
✦ The completion of a well at Kapuni, on the west coast of North Island of **New Zealand,** revealed accumulations of condensate and gas, but here also the significance must await further appraisal work by the company in which the Group has an interest.

In addition to the operations mentioned, companies in which the Group has an interest are engaged in production and/or exploration in the following countries: **Guatemala, British Honduras, Bolivia, Western Germany, Austria, Turkey, Iraq, Egypt, Gabon, Tanganyika, Kenya, Indonesia, Sarawak, Brunei, British North Borneo** and **Australia.**

Gross production of crude oil and natural gasoline

(Including quantities received under special supply contracts)

ROYAL DUTCH/SHELL GROUP OF COMPANIES



Transportation

Tankers

THE WORLD TANKER market remained depressed throughout 1959 with charter rates correspondingly low, a situation which is considered likely to continue for some time to come. At the end of the year about 5½ million tons of the world tanker tonnage—about 10 per cent—was laid up and a considerable number of ships were operating at reduced speed.

The Group has not been unaffected by these conditions and has had to bear some of the effects of the world surplus. Marginal and seasonal fluctuations in demand were largely absorbed by operating certain vessels at reduced speed, but a number of ships of the smaller and less economic types were laid up at the end of the year.

The Group fleet was augmented by approximately 760,000 tons during 1959 as a result of the acquisition of the fleet of Canadian Eagle Oil Company Limited. At the end of 1959 tanker tonnage at the disposal of the Group consisted of 551 vessels of 2,000 deadweight tons and over, aggregating a little more than 10 million tons. Of this total, 4.2 million tons were Group-managed and the remainder chartered.

As part of the policy of modernizing the Group fleet and keeping it fully competitive, twenty of the older ships were disposed of in 1959; these vessels were mainly in the 9,000 and 12,000 ton classes.

In fulfilment of contracts placed in earlier years, seven new vessels were completed for Group ownership in 1959. In addition thirteen ships, including six of 46,000 tons each, were delivered for Group management under tanker financing schemes.

Thirty-five ships with a total capacity of approximately 1½ million tons were on order at the year's end, either for ownership or to be made available to the Group under arrangements which ensure the use of the vessels for the whole of their working lives. These modern ships will further improve the overall competitive efficiency of the tanker fleet.

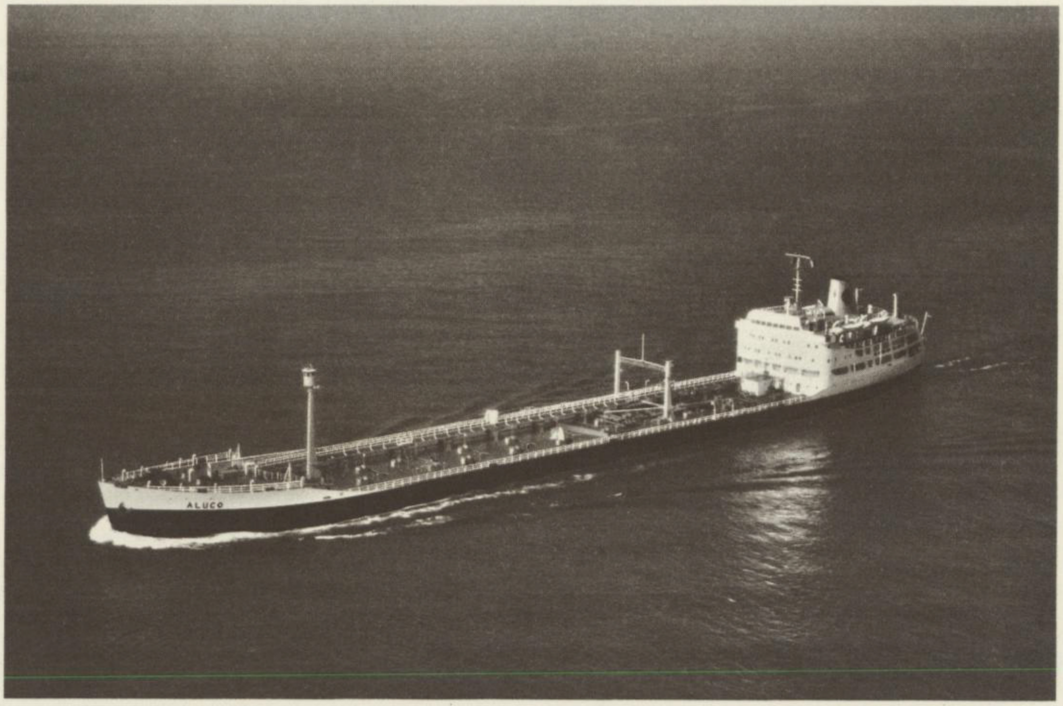
Pipelines

On land, pipelines are usually the most economic means of bulk movement of crude oil, refined products and natural gas over long distances. Group companies own either wholly or partly more than 20,000 miles of pipelines in various parts of the world, some 13,500 miles of them in **North America.** These pipeline systems are being continually extended to improve and develop the pattern of oil movement.

In addition to improvements of existing pipelines and pumping installations in which Group companies are interested, some large expansion projects were undertaken.

✦ The linking of offshore wells in the Mississippi delta with Shell Oil Company's refinery at **Norco, Louisiana, U.S.A.,** by 120 miles of 16/20-inch diameter pipeline, was completed in 1959. This line will carry some 90,000 barrels of crude oil daily across the swamplands of the delta more economically than by the former transport in barges.

✦ A 70-mile, 30/34-inch diameter line from some of the Lake Maracaibo oilfields to **Puerto Miranda, Venezuela,** was completed in 1959. This big new loading terminal was built to permit handling of large tankers.



The s.t.s. " Aluco " (19,430 D.W. tons) on her trials

The Netherlands: Work on a section of the 24-inch Rotterdam-Rhine crude oil pipeline

✦ Rapid progress was made on the 180-mile 24-inch pipeline to take crude oil from **Rotterdam** to refineries in the heart of the Ruhr and Rhineland industrial areas of **Western Germany,** including one under construction for the Group at Godorf near Cologne. This line is being built for N.V. Rotterdam-Rijn Pijpleiding Maatschappij, in which the Group's interest is 40 per cent, and 145 miles had been laid by the end of the year.

✦ The Group has a substantial interest in Société du Pipe-line Sud-Européen which is to build a large-diameter 480-mile crude oil pipeline from Lavéra on the French Mediterranean coast to refineries to be erected in the Upper Rhine valley in **France** and **Germany.**

✦ Construction of the new terminal on **Kharg Island, Iran,** in which the Group is participating, and of the connecting pipeline from the Gach Saran oilfield, is due to be completed in 1960.

✦ Construction of a pipeline, 485 miles long, to bring oil from the new fields in the Edjeleh region of the **French Sahara** to the new loading terminal in the Gulf of Gabes, **Tunisia,** is already well advanced. This line is being built by Compagnie des Transports par Pipe-line au Sahara, in which the Group has a 35 per cent interest.

✦ In **Indonesia,** a crude oil pipeline is to be laid from the Tandjung oilfield to Balikpapan on the east coast of Kalimantan, a distance of about 160 miles. An interesting technical development is that it has been found possible to obviate the use of costly heating equipment by pumping the very waxy crude oil produced from this field as a suspension in water. Thus the temperature can remain considerably lower than would otherwise be necessary.

Manufacturing

THE EFFICIENCY of refinery operation and equipment is naturally a most important factor in enabling the Group companies to supply their markets with products of the quality and quantity needed at competitive cost. Continuous research and development work is therefore necessary to ensure that design of plant and facilities is kept in the forefront of technological progress. The large variety of types of crude oil available to Group refineries also makes a major contribution to their economic and operational efficiency.

The wide range of products required for sale by Group companies throughout the world can be wholly supplied by refineries of the Group. An important element in achieving this position has been the flexibility of arrangements to deal with the large operational fluctuations resulting from changes in supply and demand. The total volume of crude oil processed in Group refineries has continued to expand; in 1959 it rose to an average of more than 2,369,000 barrels a day.

Although new refineries are being, and will continue to be, built by Group companies in many countries, the bulk of the increase in manufacturing capacity so far has been the result of extending existing refineries to meet growing demands on them. Apart from increases in throughput capacity, additions and modifications are continually being made to the installations so that products of still higher quality can be produced in response to demand. Thus in 1959 plant improvements and extensions again took place in virtually all the Group's refineries throughout the world.

The necessity of avoiding increases in the cost of products by siting refineries as close as possible to their markets has been one of the principal reasons for building and extending refineries in large consuming areas. This also enables full advantage to be taken of the economies of operating large tankers to transport crude oil in bulk instead of moving the great variety of finished products in relatively smaller vessels.

This trend is stimulated also by many countries which are not large consumers of oil products but nevertheless wish to have refineries built within their own boundaries. Their governments are attracted by the possibility of improving their balance of payments by importing crude oil instead of finished products, by the idea of creating additional employment, and by the formation of an industrial nucleus around which other industries may take shape. Accordingly, plans are currently in train for Group companies to build, or to participate in building, refineries in a number of countries, among them Turkey, Kenya, South Africa, Pakistan, the Philippines and New Zealand, and to erect an additional refinery in France.

Whether or not a small refinery of economic size can be built will depend on the range and complexity of the products specially required for a particular market, on the local costs in relation to the general level of costs elsewhere, and on the cost of supplying at that point a suitable type of crude oil which will permit the manufacture of a range of products in balance with the local requirements.

A trend now emerging in Western Europe is the establishment of refineries not on the seaboard but far inland near centres of demand. These refineries will receive their supplies of crude oil by pipeline, since this is the most efficient way to handle the volumes involved. Two such refineries, one of 80,000 barrels daily under construction in Western Germany at Godorf, near Cologne, and another projected in France at Strasbourg, will be fed by long-distance pipelines from the North Sea and the Mediterranean respectively.

[*continued page* 15

COMPETITION
and the
Royal Dutch/Shell Group

A distinguished American economist who recently carried out an independent investigation of the oil business in the United States concluded his report by remarking:

"*The oil industry continues to be one of the most competitive businesses ever seen.*"

Those who work in oil are only too familiar with the practical effects of this competition, which is not confined to selling but extends into every phase of operations.

There are hundreds of separate companies, large and small, engaged internationally in some or all of the complex operations of the oil business: exploration, production, transportation, refining and selling. The larger groups of companies, relatively few in number, conduct the greatest proportion of the business, but the vigorous competition between these groups and between each of them and other companies engaged in different phases provides the stimulus without which the oil industry could never have attained such a high level of efficiency.

Why then are oil companies so frequently targets for accusations of cartelism and monopoly?

Gasoline Prices

There is little doubt that these accusations often spring from the aspect of the oil industry which meets the public eye most prominently and frequently —the price of gasoline at the service station. There is seldom, and indeed there cannot be, much difference in price for brands of comparable quality at any given moment. This, however, is not evidence of collusive price-fixing. Similarity of price in a market for any commodity can equally be the natural consequence of strong competition.

In the gasoline market, where many companies compete, each striving to increase its volume of sales, the laws of supply and demand apply pressure on all companies to hold prices down to a level related to the costs of the more efficient operators. No company can persist in selling above the general price level resulting from this process and expect to hold its trade for long. If a company feels justified in decreasing its price and does so, its competitors must quickly follow or they will lose trade. If a company increases its price, it does so under the compulsion of economic factors which also affect its competitors, who are therefore likely to take similar action. If it has misjudged the amount of increase and others do not increase by the same amount, it will have to make a prompt readjustment.

In this way prices tend to a common level, while all the time the competitive pressure is also being applied to service, quality, technical development and overall operating efficiency. The competition ranges through every phase from the service station back to exploration methods in the field and to the negotiation of contractual rights to explore for and develop new oilfields.

Throughout their history, oil companies have had to meet an ever-increasing demand for oil which is likely to continue in the future. An expanding world economy and higher living standards for fast-growing populations largely depend on the meeting of this rising demand, and to this end new sources of oil must constantly be sought. Before existing oilfields are used up, the individual companies must seek and develop new ones if they are to supply their markets and maintain their business—or indeed if they are to stay in business at all.

Competition from Well to Pump

Competition thus begins in the initial search for new sources of oil and in obtaining exploration and production leases in unexplored territories. The competitiveness of this aspect of the business is self-evident since the owner of the oil rights, whether government or private individual, naturally will award leases to those whose offer is most attractive, taking into account their proven ability in exploring for, and developing, oilfields in the interests of both parties. Ability to sell the oil in the world's markets will be included in this, for the lessor is well aware that royalties and taxes can only be paid out of income generated from sales.

The oil company, however, must pay out the costs of exploration, drilling and production as it goes along. These costs will be measured in millions of pounds sterling and may be paid from new capital or from the retention of past earnings; if the company is to survive, the expense must be recovered quickly by sales in the world's markets. The eventual purchasers of the oil will not pay more than the competitive price at the point of sale, so in the end it is the relative cost at which any company can get its product to that point that determines the success or failure of its operations.

There is thus a great incentive to find and develop better and more reliable techniques of exploration and production. Here the competitive race extends, by way of research, into the fields of science and technology; it has led progressively from the first use of geologists at the turn of the century to such technical innovations as the use of seismic and gravimetric surveys, photogeology, micropalaeontology, electric and radioactive well-logging, etc.

The larger groups of oil companies are generally referred to as 'integrated groups'—that is to say, each of them engages in all phases of the oil industry: exploration, production, transportation, manufacturing and marketing. Even so, no single group is self-sufficient in all these phases, and they must all meet determined and formidable competition at every stage, from each other as well as from the many 'non-integrated' companies. For example, 6,500 separate companies, outside the integrated groups, between them drilled 80 per cent of all the oilwells sunk in the United States in 1958. In the international field, in addition to the integrated groups, some 250 companies of many nationalities are now competitively engaged in exploration and production in more than 80 countries and territories. A typical example is the present search being made in Libya, in which 17 companies are engaged.

Costs all along the Line

When the crude oil has been found, it has to be transported to the refineries and the finished products must then be moved to the markets. This may involve expenditure on pipelines of anything from £20,000 to £100,000 per mile, on tanker fleets costing £3½ million for each ship of 45,000 to 50,000 tons, and finally expenditure on journeys by rail car and road tank wagon. All these affect the final cost of delivering a gallon of finished product to the point of sale and every one of the numerous companies involved is intent on keeping its costs down to or below those of its competitors.

Royal Dutch/Shell Group companies are among the largest tanker operators in the world, yet they own only about 40 per cent of the ships which sail under their house flags, chartering the remainder in the open market. The Group's owned and chartered ships must be fully competitive with other ships, or the total cost of delivering products will be higher than the costs of other operators, with obvious effects on the viability of the business as a whole.

The continuous effort to supply oil products of the improved qualities required by consumers also means that, within each refining company, manufacturing techniques and equipment must continuously evolve and be replaced if they are to turn out products of the required quality at the lowest possible cost. Technological progress is so rapid in the refining industry that by the time a new unit for a certain process has been built research will often be well advanced on new or improved processes to replace it.

The Spur of Competition

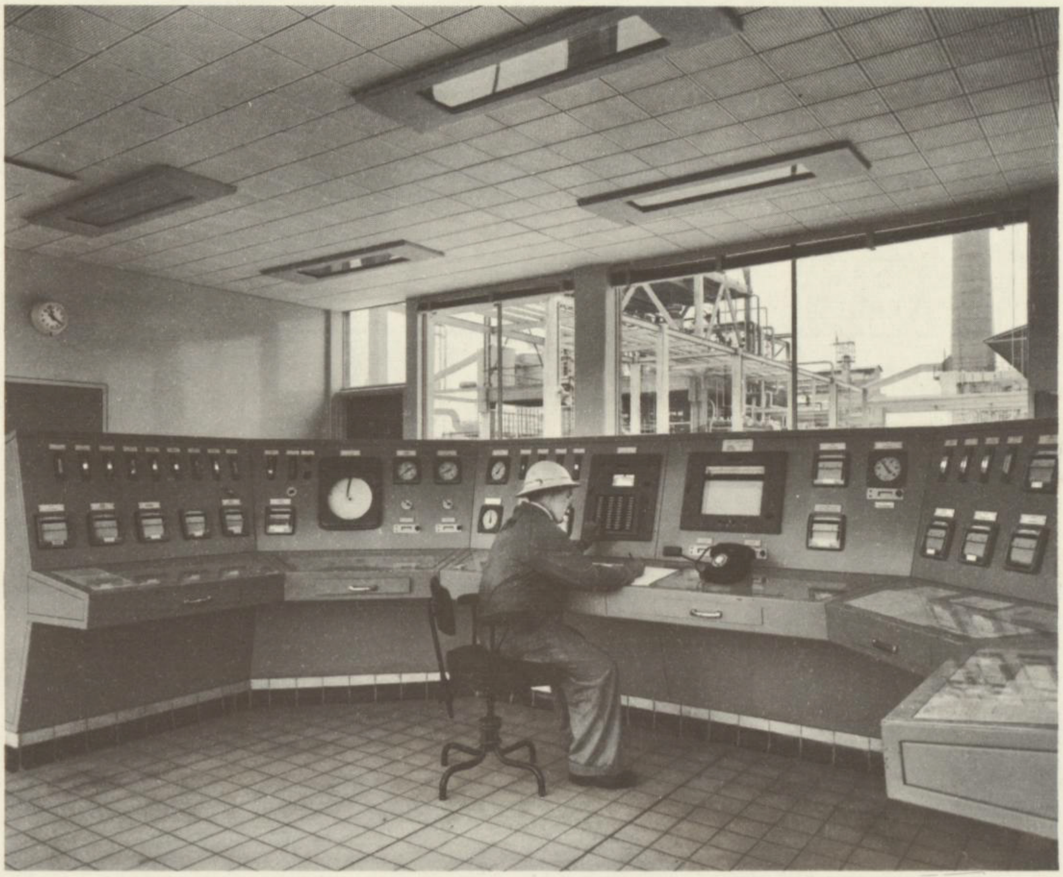
One measure of competition within any industry is the rate at which it develops new methods and processes, and by this standard the oil business has few equals. New techniques are continually being introduced in each of the principal branches from exploration to ultimate distribution, and these techniques are the applied results of research. This is why the Group companies, among the leaders in this field, are currently spending some £20 million a year on research and employ around 5,500 people in their international laboratories.

Thus, competition is ever present throughout the oil industry and the consumer benefits accordingly—in service, in quality, and in value for money.

The real price of gasoline today—taking into account the fall in the value of money—is considerably lower than it was before the war. In some countries indeed the net retail price of gasoline in *current* money terms is little different from what it was some 30 years ago. This of course is the price exclusive of tax and duties, which nowadays are often greater than the price which the oil companies receive for this product. By contrast, the prices of most other commodities have risen substantially.

In addition, the quality of gasoline has improved and engine designers have been able to take advantage of these improvements to such an extent that only 2 gallons of gasoline of present-day quality are needed to do the work that required 3 gallons then. Thus the net retail price of gasoline has effectively been reduced by about one-third.

Similar examples could be given for other oil products. They illustrate the mutual benefits that come to consumers and producers alike from the operation of well-organized and progressive companies in a competitive business.



Australia: The control room of the sulphur removal plant at the Geelong refinery

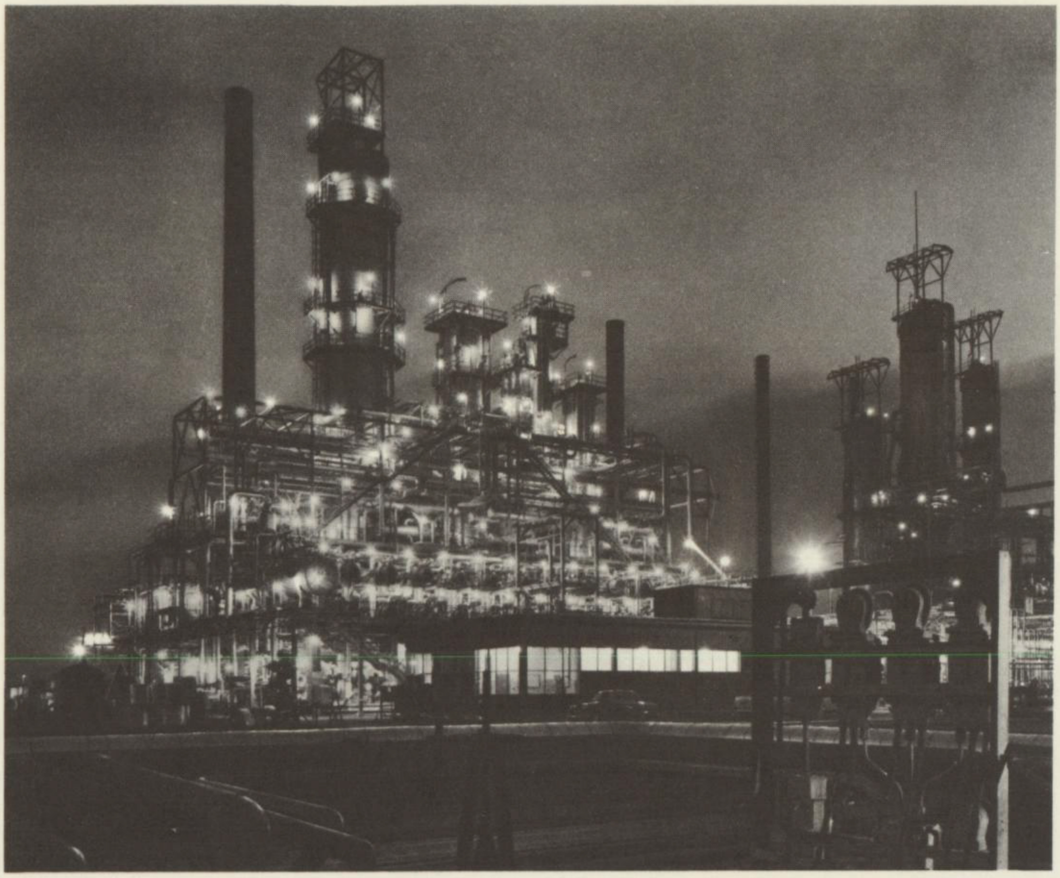
Plants constructed or expanded

✦ A sulphur removal plant for the upgrading of gas oil and diesel fuel was completed at the refinery of Shell Oil Company at **Wood River, Illinois,** in the **United States.** This plant, with a capacity of 25,000 barrels daily, is one of the largest ever built by this company. Also at Wood River the plant for manufacturing high-grade lubricating oil was expanded by the installation of a vacuum distillation and phenol extraction plant. Automatic moulding and packaging equipment for paraffin wax was installed by the same company at **Houston, Texas.**

✦ The third crude oil distilling unit of Compañía Shell de Venezuela Limited at **Cardón, Venezuela,** was expanded to raise its capacity from 40,000 to 60,000 barrels daily.

✦ A new refinery with a capacity of 40,000 barrels daily was completed at Whitegate, near **Cork,** in the **Republic of Ireland.** This refinery of Irish Refining Company Limited, in which the Group has an interest, includes a catalytic reforming unit and a sulphur removal plant.

✦ The distillation capacity of Shell Refining Company Limited's **Shell Haven** refinery in the **United Kingdom** was doubled by the installation of a crude oil distilling unit



United Kingdom: The second crude oil distilling unit at the Shell Haven refinery, completed in 1959

with a capacity of 80,000 barrels daily. A sulphur removal plant with a capacity of 16,000 barrels daily and a bitumen blowing plant were also completed at this refinery.

✦ At **Pernis,** in the **Netherlands,** a furfural extraction plant for the manufacture of chemical feedstock was installed by Shell Nederland Raffinaderij N.V.

✦ A furfural extraction plant was installed at **Petit-Couronne,** in **France,** for the manufacture of high-grade lubricating oil, by Compagnie de Raffinage Shell-Berre, in which the Group has a large interest.

✦ A sulphur removal plant with a capacity of 11,000 barrels daily was installed at **Geelong, Australia,** by Shell Refining (Australia) Proprietary Limited for the manufacture of high-grade gas oil and diesel fuel.

✦ The total refining capacity available to the Group was added to by the acquisition of the Rho refinery, near **Milan, Italy,** with a capacity of 34,000 barrels daily and also by the de-sequestration by the Government of the United Arab Republic of The Anglo-Egyptian Oilfields, Limited's 55,000 barrels a day refinery at **Suez, Egypt.**

✦ A 50 per cent partnership in Stora Kopparberg's **Koppartrans** refinery in **Sweden,** which has a capacity of some 40,000 barrels daily, was acquired by A/B Svenska Shell.

Projects in progress

✦ A lubricating oil dewaxing unit was being constructed at the **Buenos Aires, Argentina,** refinery of "Diadema Argentina", S.A. de Petróleo.

✦ The capacity of Shell Trinidad Limited's refinery at **Point Fortin, Trinidad,** will be raised by 9,500 barrels daily to 51,000 barrels daily.

✦ Replacement of Shell-Berre's atmospheric crude oil distilling plant at **Petit-Couronne, France,** was in progress and will give an increased capacity of 7,000 barrels daily. A platformer with a capacity of 13,000 barrels daily is being installed there for the upgrading of motor gasoline. A sulphur removal plant and a bitumen blowing plant were also under construction.

✦ Equipment for the manufacture of liquefied petroleum gases and bitumen at **Yokkaichi, Japan,** was being installed by Showa Yokkaichi Sekiyu Kabushiki Kaisha.

Nigeria: Service at a Shell station

Markets and Sales

IN RECENT YEARS, as the world availability of oil supplies has increased, the competition in selling, always severe, has intensified. As a direct result of the easy supply position the year 1959 was in fact marked by the most intensely competitive conditions encountered since the war. Because of the prominent position which companies of the Royal Dutch/Shell Group hold as marketers in so many countries, they experienced increased competition in many places, not only from oil companies already established there but also from others seeking to expand into new marketing areas.

As can be imagined, for Group companies to maintain their position in these conditions requires not only the highest quality of products and service but still greater flexibility and efficiency of operation to ensure that their costs are competitive in every phase of their activities. During 1959 they were actively engaged in further reducing marketing costs and achieving higher productivity in the distribution of products. Particular attention was devoted also to the possibilities of expansion into new markets and, on the basis of scientific research, the development of new uses for existing and potential products.

Notwithstanding the difficult marketing conditions these efforts were successful in increasing sales in 1959 to a total of some 2½ million barrels daily. The growth of sales over the past decade is illustrated on page 20.

Oil Products

Sales of motor gasoline by Group companies have been increasing at a slightly faster rate than for the oil industry as a whole. This satisfactory result is due to the attention that has been paid over the years to the development of efficient retail networks and to the emphasis on improving quality, in which Group companies have been in the lead.

Sales in 1959 of middle distillates, mainly kerosine, diesel and gas oils, showed an increase over 1958. In the case of fuel oils the level of sales was maintained in the face of strong competition from many suppliers, although prices were generally lower than in the previous year.

Companies of the Group once again kept their position as principal suppliers of aviation fuels to the world's airlines, sales of turbine fuels for civil use in particular expanding with the increasing use of jet aircraft by the principal airlines.

In lubricants of all types, Group companies throughout the world also retained a prominent market position.

Good progress in sales of liquefied petroleum gases continued in 1959 and there was a rapid expansion in the sales of refinery gases, used increasingly as a source of industrial heat and as town gas.

The sales of bitumen in 1959 provided a demonstration of how sensitive are the markets for oil products to world conditions, in this case climatic; the exceptionally good summer weather in Western Europe enabled rapid progress to be made with road-building and this in turn resulted in a greater consumption of bitumen, from which Group companies benefited fully.

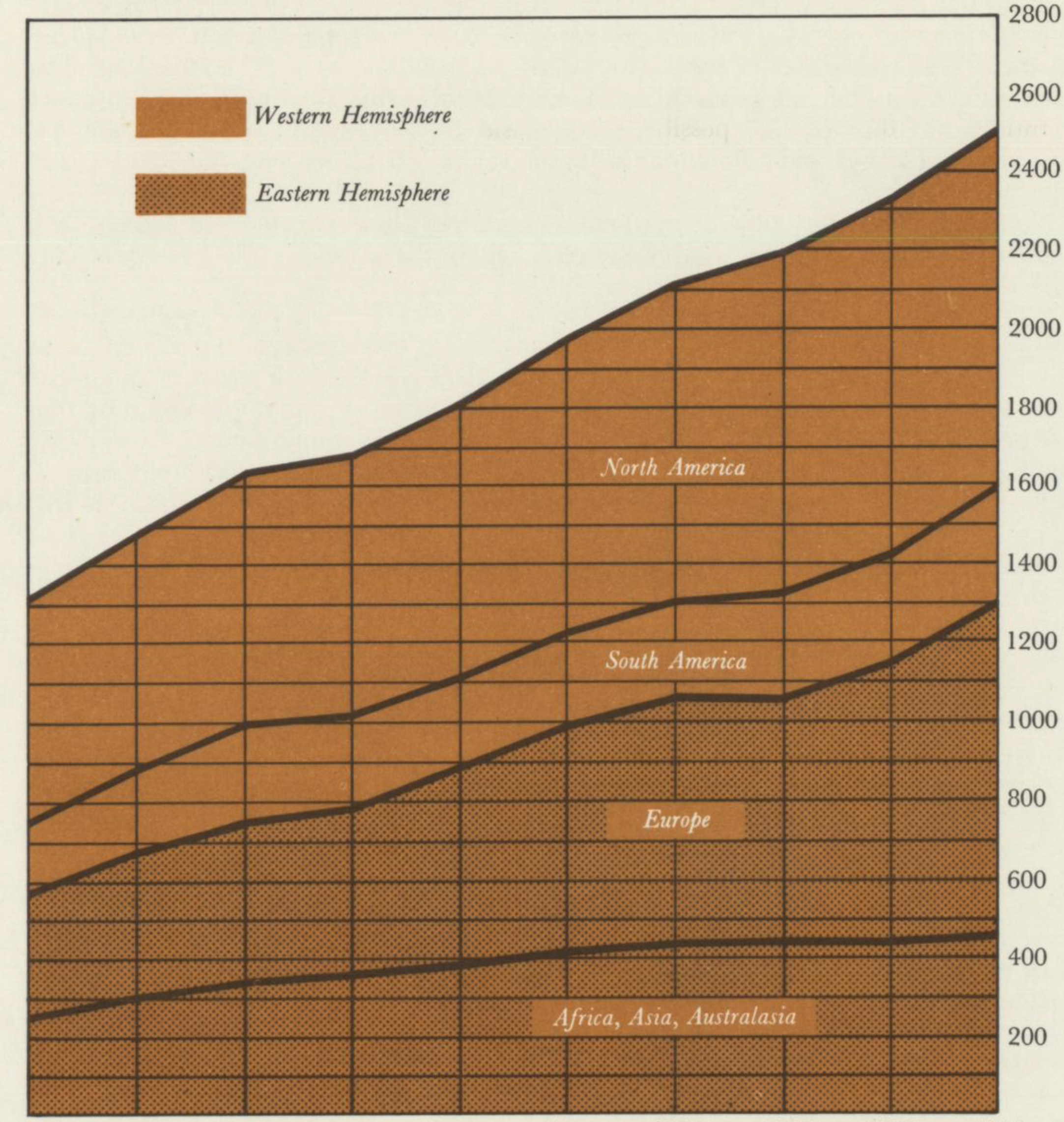
Crude Oil

In recent years Group companies have sold to customers in North America considerable quantities of crude oil, mainly from production sources in the Caribbean. In 1958, for example, these sales accounted for about one-third of the total Group sales of crude oil, but in 1959, as a result of import restrictions, there was a considerable decline.

In the rest of the world also, total sales of crude oil diminished. This statistical decline, however, is attributable to the acquisition in 1959 of the Canadian Eagle group of companies, whereby the outlet for crude oil to this group was replaced, and more than offset, by the inclusion of its product markets in Group product sales. Apart from this, sales increased substantially in 1959.

Sales of crude oil and oil products

ROYAL DUTCH/SHELL GROUP OF COMPANIES



Research

SCIENTIFIC RESEARCH by industry is largely a development of the twentieth century. No company operating in a highly technical industry can hope to improve or even maintain its position unless it keeps abreast of scientific development in its own and related fields. The importance of research in the oil industry, and even more in the chemical industry, can therefore hardly be over emphasized.

Group research activities first began in the 1890's in a small laboratory set up in the Netherlands, and have been developing and expanding ever since. The reputation that 'Shell' products have gained throughout the world could not in fact have been achieved without intensive research programmes. The balance between these programmes and the operational requirements of the companies, of course, needs to be continuously reviewed and adjusted, from both short-term and long-term viewpoints. In 1959, for example, to strengthen the basic effort directed at exploring new syntheses, particularly in the field of organic chemistry, a new laboratory was established at Birlinghoven, near Bonn, by Shell Grundlagenforschung Gesellschaft m.b.H., a company wholly owned by Deutsche Shell A.G. This laboratory will be staffed mainly by German scientists.

As a result of rapid expansion in the manufacture of chemical products from oil, the amount spent by Group companies on research on chemical processes and products is now greater than that spent on oil processes and products. This, of course, is in addition to substantial expenditure for developing still more advanced techniques of exploration, production, transportation and storage. Group companies now employ about 5,500 men and women in 16 research laboratories in the United States and Europe, and are currently spending some £20 million a year on research.

A few examples of the nature and scope of oil research are given here; chemical research is treated separately on page 28.

Oil Research

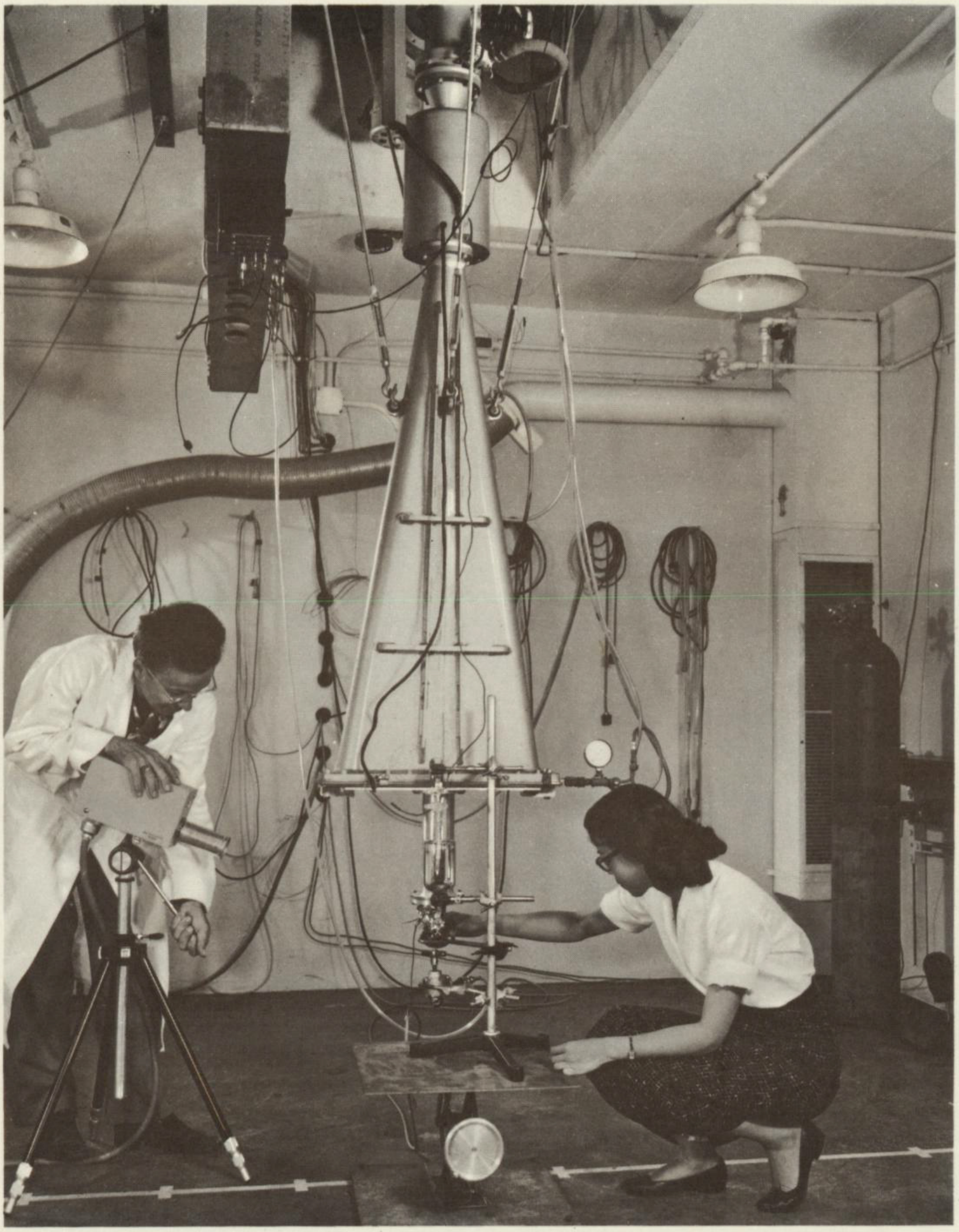
Since the first requirement is to find crude oil, continuous research is carried on to study the factors affecting the origin, migration, underground accumulation and preservation of oil.

Increased attention has been paid to the manner of formation of recent marine deposits; observations made by field parties have considerably augmented the work being done in the laboratories on this subject.

An example of research in the production phase is the investigation by Group companies of the acoustic well-logging method, which has resulted in the successful application of this tool in studying the porosity of underground strata. Such studies often require the application of the most advanced developments in the fields of chemistry and physics as well as in specialized branches of geology, geophysics and engineering.

Since any industrial discovery can be quickly outstripped in the fast-developing technology of the oil business, there must also be continuous effort to find better and more economic methods of manufacturing and transporting crude oil and products. The success of research is therefore a factor determining competitive efficiency in every phase of the operations carried out by Group companies.

In the field of oil products and manufacturing processes the present tendency is towards consolidation of existing research projects, largely aiming at the adaptation of fuels and lubricants to the ever-increasing demands of modern engines.



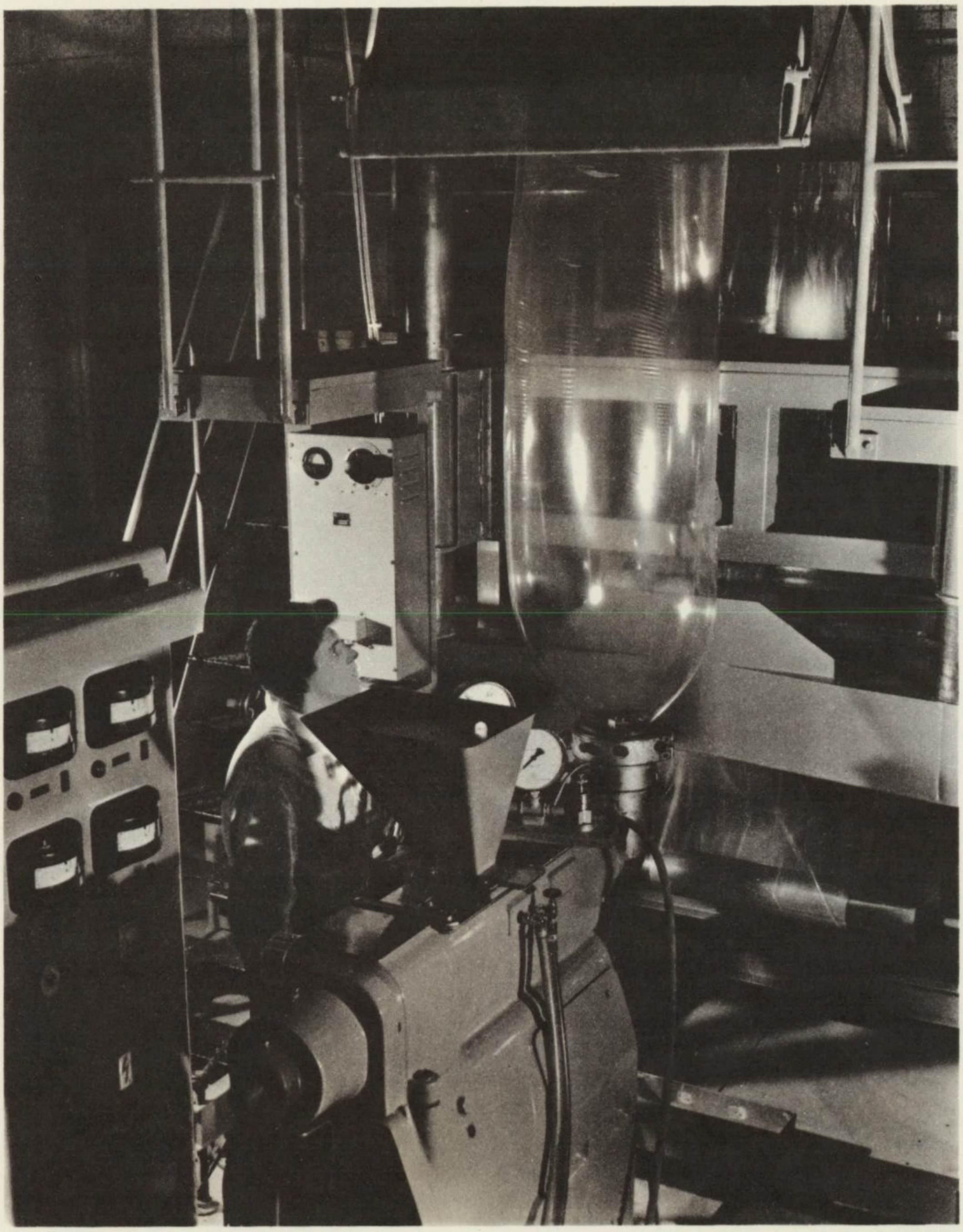
United States: Positioning a closed-circuit television camera on a sample of a petroleum product to be subjected to high-energy radiation from a 3 million electron volt Van de Graaff generator

In the sphere of aviation, for example, the Group was first in the field with a kerosine-type fuel having a freezing point below minus 50 degrees Centigrade, thereby meeting the needs of the new jet-powered civil airliners flying at high altitudes.

Both pure jet and turbo-prop engines are particularly sensitive to traces of water in suspension in aviation turbine fuels. A device developed by Group laboratories is capable of detecting the presence of water in kerosine in quantities as minute as 30 parts per million. Although patented, it has been made freely available in the interests of safety to anyone in aviation who has wished to use it.

The improvement of hypoid gear oils to meet the exacting demands of modern high-performance automobile transmissions is an outstanding recent development in the lubricants field.

After many years of research Group laboratories have evolved 'Epikote' resin/asphalt combinations which show great promise as paving materials for airports. Their ability to withstand the heat and blast of jet engines, as well as to resist the effect of cleansing solvents and hydraulic fluids, is particularly important.



The Netherlands: Film-blowing equipment in the Plastics Laboratory, Delft

Chemical Companies
# of the Royal Dutch/Shell Group

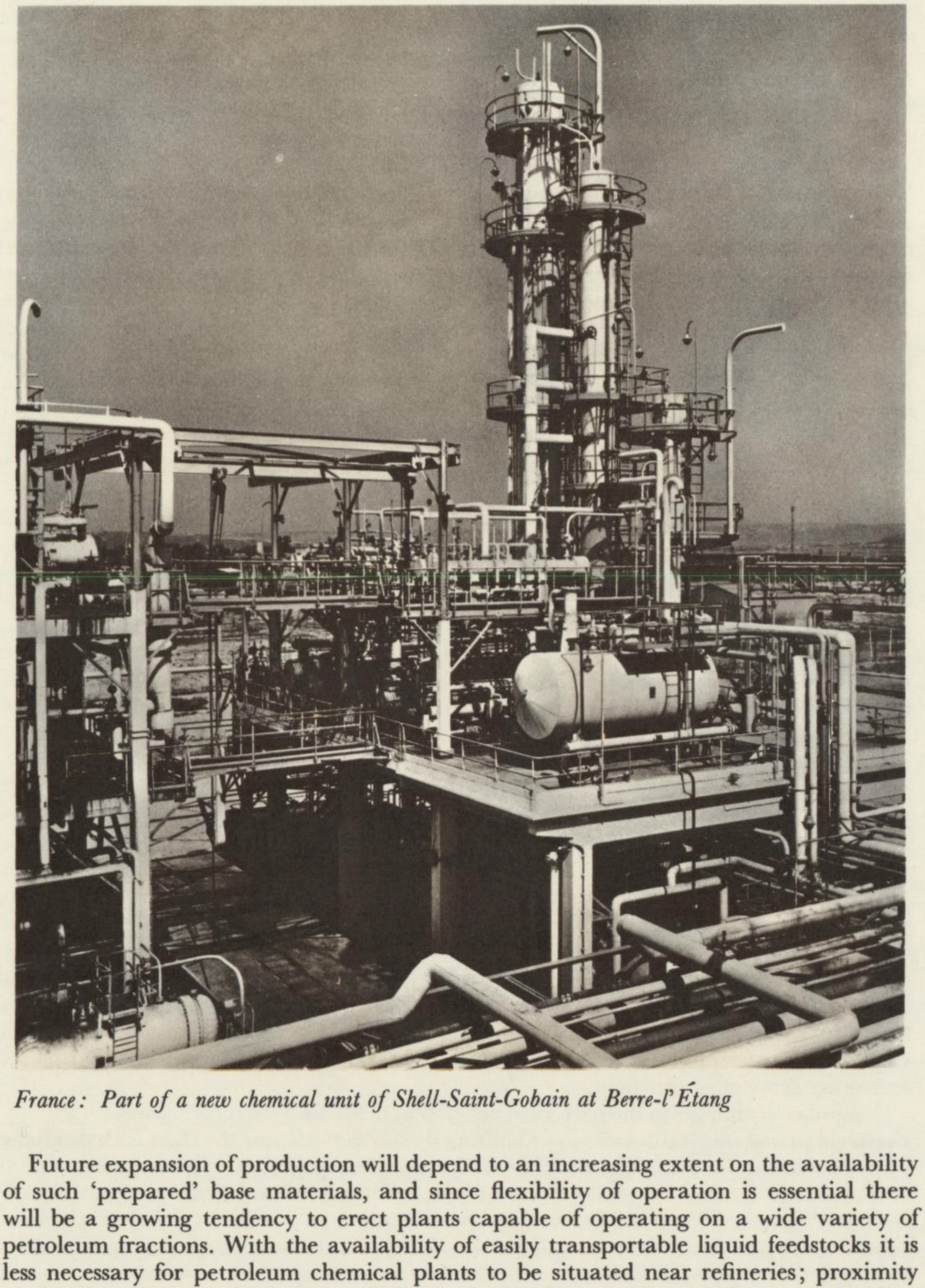
THE WORLD PRODUCTION of chemicals manufactured from petroleum continues to grow considerably faster than the chemical industry as a whole, which itself is developing faster than industrial production in general. Petroleum is now the principal raw material source for the manufacture of organic chemicals and is being used to an increasing extent in the production of inorganic chemicals. Among petroleum-based chemical products the organics remain very much more important than the inorganics in value of production. In the United States, where developments in this field began before the war, production of organic chemicals from petroleum has increased four-fold over the last ten years. In the other principal centre of production, Western Europe, where the development has been much more recent, manufacture of petroleum-based organic chemicals has increased over three-fold during the last five years and growth in this area continues to be very rapid.

Although oil companies were pioneers in the use of petroleum as a base material for chemicals, established chemical companies were also quick to take advantage of this abundant new source of supply and they are now by far the largest consumers of oil for chemical manufacture, accounting between them for about two-thirds of the total production.

The traditional raw materials for producing organic chemicals were coal and vegetable matter; petroleum by and large has supplemented these, rather than replaced them, and identical chemicals are now produced from all three sources. The manufacture of chemicals from petroleum is thus not a separate industry but is an integral part of the chemical industry; consequently the chemical companies of the Royal Dutch/Shell Group are a part of the chemical industry at large and, therefore, the skills and techniques which these companies employ, the markets they supply and indeed their whole operational philosophy must be those of the chemical industry.

It had been felt for some time that the essential differences between the oil and chemical sides of the Group's business made the creation of a separate integrated chemical organization desirable. This was achieved in 1959 when a gradual process of evolution over a number of years, during which operating companies had been set up in several countries to deal exclusively with chemical activities, culminated in the formation of Shell International Chemical Company Limited in London and Bataafse Internationale Chemie Maatschappij N.V. in The Hague, to provide centralized advice, information and other services in this field.

A number of changes in the pattern of development are likely in future years. Originally, chemical plants were built close to or within oil refineries because the chemicals produced were based on the gases obtained from the cracking processes employed in gasoline manufacture. During the early years only a few types of chemicals were produced; recently, however, great advances have been made and a wide diversity of chemical products are now made from petroleum. In some areas this increased demand could not be satisfied solely by the utilization of refinery gases and there has consequently been a growing tendency for the chemical industry to prepare its own special base materials from a wide range of oil products.



France: Part of a new chemical unit of Shell-Saint-Gobain at Berre-l'Étang

Future expansion of production will depend to an increasing extent on the availability of such 'prepared' base materials, and since flexibility of operation is essential there will be a growing tendency to erect plants capable of operating on a wide variety of petroleum fractions. With the availability of easily transportable liquid feedstocks it is less necessary for petroleum chemical plants to be situated near refineries; proximity to the large industrial markets will be an increasingly important factor in deciding their location.

One of the principal reasons for the rapid growth in the production of chemicals from petroleum during the last decade is the rate at which standards of living have been rising throughout the world. Improving living standards are reflected in the steep rise in the demand for consumer goods, including domestic equipment and a whole range of articles made from plastics and synthetic fibres. Increasing quantities of organic chemicals find their end use in these products and it is true to say that the progress achieved in producing many of these consumer goods would have been impossible without the development of petroleum as an additional source for chemicals. In the manufacture of chemicals for agriculture, the Group chemical companies are making an important contribution to the production of food throughout the world.

Operation in rapidly expanding markets is not, however, necessarily a guarantee of financial success. The fact that rapid growth is confidently predicted for the use of chemicals based on petroleum has undoubtedly attracted, and will continue to attract, new companies to enter the business and will encourage established companies to expand their facilities. Increasing competition is therefore likely in the years ahead.

The minimum economic size of a petroleum chemical plant is usually fairly large, so that activity in this field involves heavy capital expenditure. Moreover, in these plants the ratio of fixed to variable costs tends to be high, so that once a plant has been built it is essential that it should be operated at or near full capacity in order to ensure that a satisfactory financial return on the investment is obtained. Furthermore, in view of the size and complexity of petroleum chemical plants the time required for their design and building is seldom less than two to three years. For these various reasons accurate market forecasts reaching well into the future are particularly essential in planning new capacity for the production of chemicals from petroleum.

Expansion of Chemical Manufacturing Facilities

Today the Group chemical companies make and sell products representative of almost every type in the field of chemicals from petroleum. The following are some examples of increases in manufacturing capacity which have been provided in 1959 to supply rapidly expanding markets:

✦ In the **United States,** a highlight was the initiation of commercial production of isoprene rubber at **Torrance, California,** which is to be followed by production on a substantial scale in 1960. At **Houston, Texas,** the phenol/acetone plant commenced operation. The construction of the plants at **Norco, Louisiana,** for the manufacture of glycerine via acrolein is making satisfactory progress. It is expected that these plants will be started up during 1960.

✦ Progress in the **United Kingdom** included the commissioning of new plants for the manufacture of ammonia, nitrogenous fertilizers, and ethylene oxide and its derivatives. Plans were also initiated to install a major complex of plants for the manufacture of polyethylenes and polypropylenes. The first phase in the increase in the ethylene capacity at **Carrington** was completed during the year and the second phase will be completed in 1960. In this connection work also began during the year on a multiple pipeline system linking the Carrington chemical plant near Manchester with the Stanlow refinery near Chester. Construction of the ethyl benzene and styrene plants at Carrington is nearing completion. The detergent alkylate plant at **Shell Haven** has been increased in capacity during the year.

✦ In the **Netherlands,** construction of the large new synthetic rubber plant at **Pernis** is nearing completion. The synthetic glycerine plant was expanded during the year and a further extension of capacity will take place in 1960. An extension to the solvents plant was put into operation during the year and further extensions are in course of construction. A plant for the production of a new type of pesticide will start early in 1960.

✦ In **France,** S.A. des Produits Chimiques Shell-Saint-Gobain, in which the Group has a major interest, carried out an extension of its solvents plant at **Berre-l'Étang,** and a new plant for the manufacture of non-ionic detergents is now in operation. Construction of the synthetic rubber plant with a capacity of 50,000 tons a year for Société des Elastomères de Synthèse, in which the Group is associated with an American company and a number of French companies, began during the year.

✦ In **Western Germany,** Rheinische Olefinwerke G.m.b.H., which the Group owns jointly with a German chemical company, considerably expanded its low-density polyethylene facilities at **Wesseling** and initiated a further expansion. It also brought into operation a new plant using a different process to produce high-density polyethylene.

✦ A major complex of chemical plants including facilities for the manufacture of ethylene, polyethylene and styrene was brought into operation at **Yokkaichi** in **Japan** by Mitsubishi Yuka Kabushiki Kaisha, in which the Group has a minority interest. Facilities for manufacture of ethylene oxide and ethylene glycol are nearing completion.

✦ In **Australia,** the plant for the manufacture of 'Epikote' resins at **Clyde** will be completed early in 1960. Construction of a detergent alkylate plant was started at **Geelong.**

Chemical Research

As a consequence of continuous development in the manufacture of chemical products from oil, increased emphasis on chemical research will be necessary in the years ahead.

The progress made by Group companies in this field has been rapid. The first process for manufacturing detergents from oil was developed by a Group company before the war and put into operation on a commercial scale in the United Kingdom in 1942; the Group continues to be actively engaged in this field.

The synthesis of glycerine from oil, first achieved by one of the Group companies, was another milestone in the use of oil as a base material for the chemical industry. Processes now used for the production of hydrogen peroxide and of the important new chemical intermediate acrolein have also been developed by Group research.

Significant contributions have been made to the evolution of plastics and synthetic rubber. Polydiene rubbers with structures and properties resembling natural rubber have recently emerged from the laboratories and pilot plants. Plastics research is also being pressed ahead to discover new products, processes and applications that will ensure and maintain the Group's share of this rapidly expanding market. World production of plastics has grown from about 40,000 tons at the end of the 1920's to some 4 million tons in 1958. An interesting fact is that, by weight, it has actually outrun the production of any one of the important non-ferrous metals such as aluminium, copper and lead. The establishment of a special Plastics Laboratory at Delft, in the Netherlands, mentioned in previous years, is one of the steps taken to increase the Group's effort in this sector of the chemical industry.

Much attention is being given to the development of new types of insecticides capable of controlling pests that have developed a degree of resistance to existing pesticides. Several of these new compounds are now under development in laboratory and field trials.

The future of chemicals from oil obviously depends, as does that of the chemical industry in general, on success in research. It is fortunate that, with at the present only about two per cent of the world's crude oil and natural gas production going into the manufacture of chemicals, availability of base materials puts no brake on further chemical expansion, in which Group companies expect to play a major part, supported by the Group's extensive activities in research.